

REMARKS

Claims 1-18 are currently pending in the present Application.

Claim rejections under 35 U.S.C. § 102(b) include claims 1-18 as anticipated by German patent document DE 29 05 130 A1 (“DE ‘130”) and by German patent document G 91 11 065.3 (“G ‘065”), and claims 1-10 and 16-17 by U.S. Patent No. 5,879,099 to Thomas (“Thomas”).

In addition, claims 3 and 14 stand rejected under 35 U.S.C. § 112, second paragraph, as reciting indefinite claim language. In response to this rejection, the Applicants have amended claims 3 and 14 to eliminate the “preferably” phrase, and reword the phrase containing the objected-to “or” for clarity. Reconsideration and withdrawal of the pending § 112 rejection is therefore respectfully requested.

Response to § 102(b) Rejections: The Applicant respectfully traverses the pending rejections under § 102(b) on the grounds that none of the references discloses the features of the present invention recited in the pending independent claims.

The present invention is directed to a novel approach to fix an add-on part to a hollow profile member by internal high-pressure deformation, wherein the add-on part material has a *lower* yield strength than a material of the hollow profile (as opposed to the conventional practice of expanding a lower-yield strength tube into a *stronger* outer part). In addition, the claims recite that the add-on part “is only jammed to the hollow profile locally at a location of the recess” in the add-on part. The Applicants have thus devised a cost-effective,

production-efficient way of providing friction-joined subassemblies, for example, a vehicle steering column, using an assembly approach which is contrary to conventional practice.

Previously, where a hollow tube and an add-on part such as a steering column collar were to be joined by internal pressurization of the tube, the add-on part had a *higher* material strength than the tube to ensure the add-on part could withstand the pressure applied by the tube. In order to obtain such high strength, use of expensive high-strength alloy materials and/or expensive machining or casting operations has been required to obtain suitable add-on parts.

In contrast, in the present invention the focusing of the hollow profile deformation at a recess in the add-on part (which is located away from the ends of the part) results in local contact pressure that allows the hollow profile material to flow in a controlled manner into the recess, while at the same time avoiding excessive pressure that could cause the add-on part to rupture. *See, e.g.*, Application ¶ [0007] (“the arrangement of the recess and spacing of it away from the ends of the add-on part ... ensure that the hollow profile material can flow into the recess without immediately resulting in an excessive contact stress ... which stress would destroy the add-on part”).

The Applicants’ discovery thereby allows the use of lower-strength add-on parts than previously possible with conventional practice, which in turn may be manufactured at significantly lower cost, using lower strength alloys and/or in less complex shapes which require less complex molds or less machining.

None of the cited references disclose or suggest the features recited in the present independent claims regarding lower add-on part material strength and location of the add-on part's recess away from the part's ends to permit joining without destroying the add-on part. Each of the references is cited in the Office Action as showing various configurations of deformed tubes within outer parts, but neither DE '130, G '065 nor Thomas appears to disclose or suggest the present invention's approach to joining by deforming a higher strength hollow profile member into a lower strength part.

The DE '130 reference discloses a steering column in which steering shaft 6 is fixed in steering column 1 by dimples or webs pressed from *outside* inward bearing to the steering column jacket. See De '130 Fig. 2. The add-on part is therefore not pushed onto the hollow profile as in the present invention (rather, it is pushed inward. Further, there are no recesses disclosed into which the hollow profile or the bearing is (or could be) expanded. Moreover, there is nothing in DE '130 disclosing or suggesting the present invention's arrangements of lower- and higher-strength materials.

The G '065 reference discloses nothing regarding the present invention. At most, as shown in G '065 Fig. 3, sleeve 21 has stiffening ridges formed on its outer periphery, but there is nothing in this reference which begins to suggest the present invention's add-on "jammed to the hollow profile in this sliding-fit position by an expansion of the hollow profile, the expansion being formed by internal high-pressure deformation." Indeed, there is nothing in this reference which even hints at any internal-pressure-driven expansion, as tube 19 is

illustrated as perfectly cylindrical, even in the regions immediately adjacent to the ridges on sleeve 21. And as with DE '130, there is no suggestion of the present invention's application of lower- and higher-strength materials.

Finally, Thomas not only fails to disclose the present invention's add-on part being "only jammed to the hollow profile locally at a location of the recess," this reference teaches away from the present invention by suggesting the conventional approach to expansion, *i.e.*, wherein the outer component's material strength is suggested to be higher than the inner element's. Thomas at 5:5-8 ("[T]he material of [inner] structural part 9 may be softer than that of [outer] structural part 12 ..."). Thus, Thomas does not disclose or suggest the present invention's add-on part which "consists of a material of *lower* yield strength than a material of the hollow profile."

Because none of the cited references discloses all the features of the present invention recited in claims 1-18, the Applicants respectfully request reconsideration and withdrawal of the pending § 102(b) rejections.

CONCLUSION

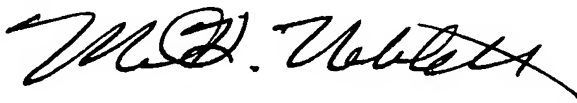
Applicants respectfully submit that the application is now in condition of allowance. Early and favorable consideration and issuance of a Notice of Allowance for claims 1-18 is respectfully requested.

If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response. Please charge any such fee or any deficiency in fees, or credit any overpayment of fees, to Deposit Account No. 05-1323 (Docket 225.50785US).

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Respectfully submitted,



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